

# MAJOR IN MECHANICAL ENGINEERING, AEROSPACE ENGINEERING CONCENTRATION

Aerospace engineering covers the design, construction, and science of aircraft and spacecraft. Designed for undergraduate mechanical engineering majors, the aerospace concentration offers students a mechanical engineering degree foundation and specialized training in the aerospace discipline. Coursework will focus on aerospace fundamentals, including fluid flow mechanics, propulsion, materials, and manufacturing. The required courses will provide an introduction to the processing steps required in aerospace development, with a focus on the design, manufacturing, and life cycle costs of a specific product.

## Learning Objectives

Students will:

1. Apply knowledge of mathematics, science, and engineering;
2. Design and conduct experiments, as well as analyze and interpret data;
3. Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability arenas;
4. Function on multidisciplinary teams;
5. Identify, formulate, and solve engineering problems;
6. Model professional and ethical responsibility;
7. Communicate effectively;
8. Understand the impact of engineering solutions in a global, economic, environmental, and societal context;
9. Recognize the need for and engage in life-long learning;
10. Utilize the techniques, skills, and modern engineering tools necessary for engineering practice.

## Requirements Effective Fall 2025

### Freshman

		AUCC	Credits
CO 150	College Composition (GT-CO2)	1A	3
ENGR 111	Fundamentals of Engineering		3
ENGR 114	Engineering for Grand Challenges		3
MATH 160	Calculus for Physical Scientists I (GT-MA1)	1B	4
MATH 161	Calculus for Physical Scientists II (GT-MA1)	1B	4
PH 141	Physics for Scientists and Engineers I (GT-SC1)	3A	5
Select one group from the following:			
Group A:			
CHEM 111	General Chemistry I (GT-SC2)	3A	
CHEM 112	General Chemistry Lab I (GT-SC1)	3A	
Group B:			
CHEM 120	Foundations of Modern Chemistry (GT-SC2)	3A	
CHEM 121	Foundations of Modern Chemistry Laboratory (GT-SC1)	3A	
Historical Perspectives ( <a href="https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#historical-perspectives">https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#historical-perspectives</a> )		3D	3

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**Total Credits** **30**

### Sophomore

CIVE 260	Engineering Mechanics-Statics		3
CIVE 261	Engineering Mechanics-Dynamics		3
MATH 261	Calculus for Physical Scientists III		4
MATH 340	Intro to Ordinary Differential Equations		4
MECH 200A	Introduction to Manufacturing Processes: Lecture		3
MECH 200B	Introduction to Manufacturing Processes : Laboratory		1
MECH 207	Mechatronics I		3
MECH 210	Engineering Design--3D Modeling and Printing		2
MECH 231	Engineering Experimentation		2
PH 142	Physics for Scientists and Engineers II (GT-SC1)	3A	5

Social and Behavioral Sciences ( <a href="https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#social-behavioral-sciences">https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#social-behavioral-sciences</a> )	3C	3
<b>Total Credits</b>		<b>33</b>
<b>Junior</b>		
CIVE 360	Mechanics of Solids	3
MECH 305	Mechanical Engineering Computational Methods	3
MECH 307	Mechatronics II	3
MECH 324	Dynamics of Machines	4
MECH 325	Machine Design with Finite Element Analysis	4
MECH 331A	Introduction to Engineering Materials: Lecture	3
MECH 331B	Introduction to Engineering Materials : Lab	1
MECH 339	Thermodynamics I for Mechanical Engineers	3
MECH 342	Fluid Mechanics for Mechanical Engineers	3
MECH 344	Heat and Mass Transfer	4B 3
Advanced Writing ( <a href="https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#advanced-writing">https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#advanced-writing</a> )	2	3
<b>Total Credits</b>		<b>33</b>
<b>Senior</b>		
MECH 338	Thermal/Fluid Sciences Laboratory	1
MECH 439	Thermodynamics II for Mechanical Engineers	3
Select one group from the following:		6
Group A:		
MECH 486A	Engineering Design Practicum: I	4A,4C
MECH 486B	Engineering Design Practicum: II	4C
Group B:		
MECH 498A	Engineering Research Practicum: I	4A,4C
MECH 498B	Engineering Research Practicum: II	4C
Aerospace Engineering Electives – select a minimum of 12 credits from the following:		12
MECH 417	Control Systems	
MECH 420	Aerospace Structures	
MECH 425	Mechanical Engineering Vibrations	
MECH 426	Advanced Machine Design	
MECH 450	Aerospace Propulsion	
MECH 460	Aeronautics	
MECH 468	Space Propulsion and Power Engineering	
MECH 478	Computational Fluid Dynamics	
MECH 507	Laser Diagnostics for Thermosciences	
MECH 515	Advanced Topics in Mechanical Vibrations	
MECH 517	Chemical Rocket Propulsion	
MECH 518	Orbital Mechanics	
MECH 519	Aerospace Vehicles Trajectory and Performance	
MECH 520	Finite Element Analysis in Mechanical Engr	
MECH 535	Mechanics of Composite Materials	
MECH 539	Advanced Fluid Mechanics	
MECH 551	Physical Gas Dynamics I	
MECH 557	Turbomachinery	
MECH 558	Combustion	
MECH 567	Broad-Beam Ion Sources	
SYSE 501	Foundations of Systems Engineering	
1C ( <a href="https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#aucc">https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#aucc</a> )	1C	3

Arts and Humanities (<https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/3B#arts-humanities>) 6

**Total Credits** 31

**Program Total Credits:** 127

## Major Completion Map

**TO PREPARE FOR FIRST SEMESTER:** The curriculum for this major assumes students enter college prepared to take calculus.

### Distinctive Requirements for Degree Program:

#### Freshman

Semester 1		Critical	Recommended	AUCC	Credits
CO 150	College Composition (GT-CO2)		X	1A	3
ENGR 111	Fundamentals of Engineering	X			3
MATH 160	Calculus for Physical Scientists I (GT-MA1)	X		1B	4
Select one group from the following:					5
Group A:					
CHEM 111	General Chemistry I (GT-SC2)	X		3A	
CHEM 112	General Chemistry Lab I (GT-SC1)	X		3A	
Group B:					
CHEM 120	Foundations of Modern Chemistry (GT-SC2)		X	3A	
CHEM 121	Foundations of Modern Chemistry Laboratory (GT-SC1)		X	3A	
<b>Total Credits</b>					<b>15</b>

Semester 2		Critical	Recommended	AUCC	Credits
ENGR 114	Engineering for Grand Challenges	X			3
MATH 161	Calculus for Physical Scientists II (GT-MA1)	X		1B	4
PH 141	Physics for Scientists and Engineers I (GT-SC1)	X		3A	5
Historical Perspectives ( <a href="https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#historical-perspectives">https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#historical-perspectives</a> )					3
CO 150 must be completed by the end of Semester 2.					
<b>Total Credits</b>					<b>15</b>

#### Sophomore

Semester 3		Critical	Recommended	AUCC	Credits
CIVE 260	Engineering Mechanics-Statics	X			3
MATH 261	Calculus for Physical Scientists III	X			4
MECH 210	Engineering Design-3D Modeling and Printing	X			2
PH 142	Physics for Scientists and Engineers II (GT-SC1)	X		3A	5
Social and Behavioral Sciences ( <a href="https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#social-behavioral-sciences">https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#social-behavioral-sciences</a> )					3
<b>Total Credits</b>					<b>17</b>

Semester 4		Critical	Recommended	AUCC	Credits
CIVE 261	Engineering Mechanics-Dynamics	X			3
MATH 340	Intro to Ordinary Differential Equations	X			4
MECH 200A	Introduction to Manufacturing Processes: Lecture	X			3
MECH 200B	Introduction to Manufacturing Processes : Laboratory	X			1
MECH 207	Mechatronics I	X			3
MECH 231	Engineering Experimentation	X			2
<b>Total Credits</b>					<b>16</b>

#### Junior

Semester 5		Critical	Recommended	AUCC	Credits
CIVE 360	Mechanics of Solids	X			3
MECH 305	Mechanical Engineering Computational Methods	X			3
MECH 307	Mechatronics II	X			3
MECH 331A	Introduction to Engineering Materials: Lecture	X			3

MECH 331B	Introduction to Engineering Materials : Lab	X			1
MECH 339	Thermodynamics I for Mechanical Engineers	X			3
<b>Total Credits</b>					<b>16</b>
<b>Semester 6</b>		<b>Critical</b>	<b>Recommended</b>	<b>AUCC</b>	<b>Credits</b>
MECH 324	Dynamics of Machines	X			4
MECH 325	Machine Design with Finite Element Analysis	X			4
MECH 342	Fluid Mechanics for Mechanical Engineers	X			3
MECH 344	Heat and Mass Transfer	X		4B	3
Advanced Writing ( <a href="https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#advanced-writing">https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#advanced-writing</a> )			X	2	3
<b>Total Credits</b>					<b>17</b>
<b>Senior</b>					
<b>Semester 7</b>		<b>Critical</b>	<b>Recommended</b>	<b>AUCC</b>	<b>Credits</b>
MECH 338	Thermal/Fluid Sciences Laboratory	X			1
MECH 439	Thermodynamics II for Mechanical Engineers	X			3
Select one course from the following:					3
MECH 486A	Engineering Design Practicum: I	X		4A,4C	
MECH 498A	Engineering Research Practicum: I	X		4A,4C	
Aerospace Engineering Electives (See List on Requirements Tab)			X		6
Arts and Humanities ( <a href="https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities">https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities</a> )			X	3B	3
<b>Total Credits</b>					<b>16</b>
<b>Semester 8</b>		<b>Critical</b>	<b>Recommended</b>	<b>AUCC</b>	<b>Credits</b>
Select one course from the following:					3
MECH 486B	Engineering Design Practicum: II	X		4C	
MECH 498B	Engineering Research Practicum: II	X		4C	
Aerospace Engineering Electives (See List on Requirements Tab)			X		6
1C ( <a href="https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#aucc">https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#aucc</a> )			X	1C	3
Arts and Humanities ( <a href="https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities">https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities</a> )			X	3B	3
The benchmark courses for the 8th semester are the remaining courses in the entire program of study.		X			
<b>Total Credits</b>					<b>15</b>
<b>Program Total Credits:</b>					<b>127</b>